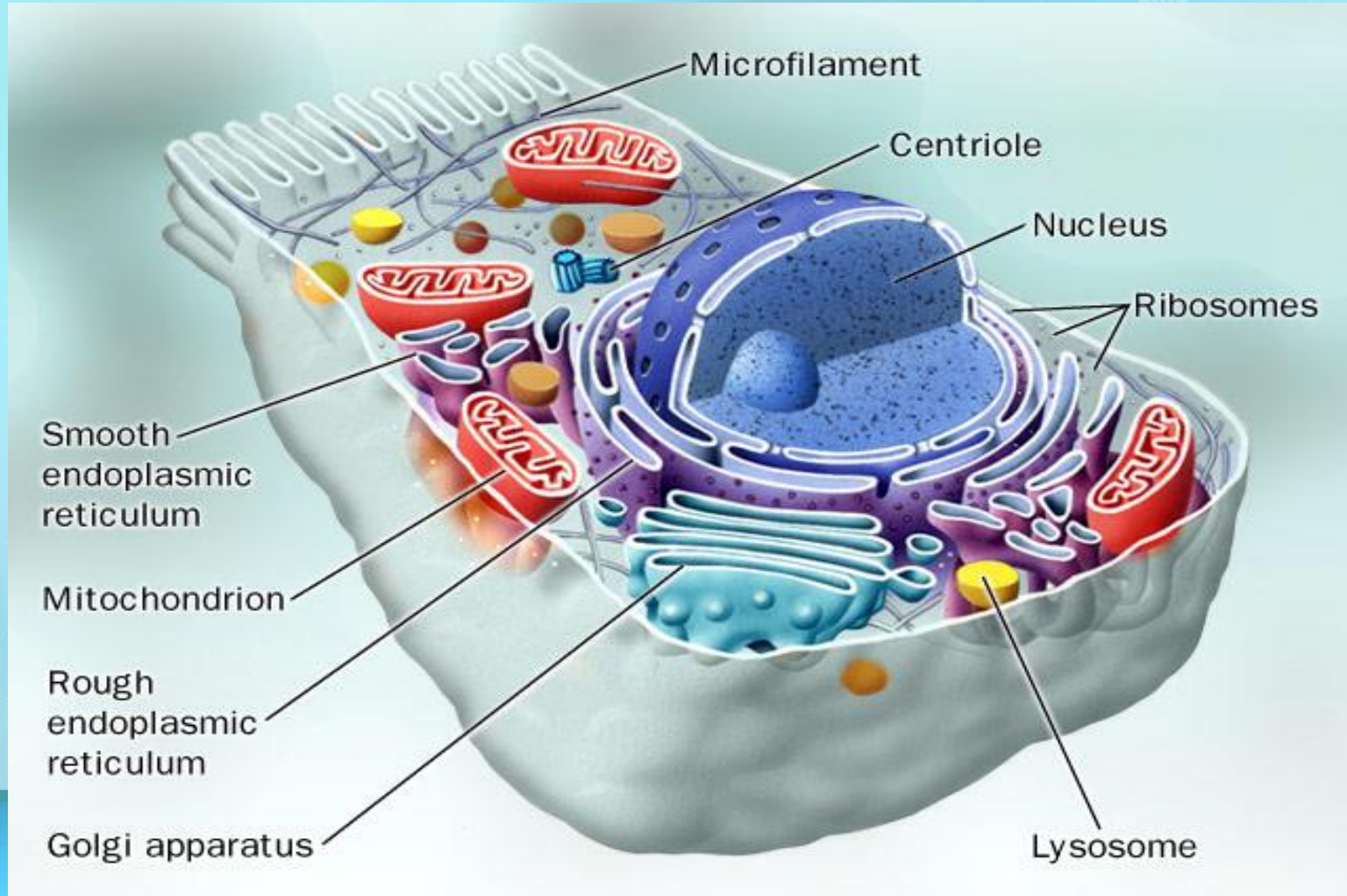
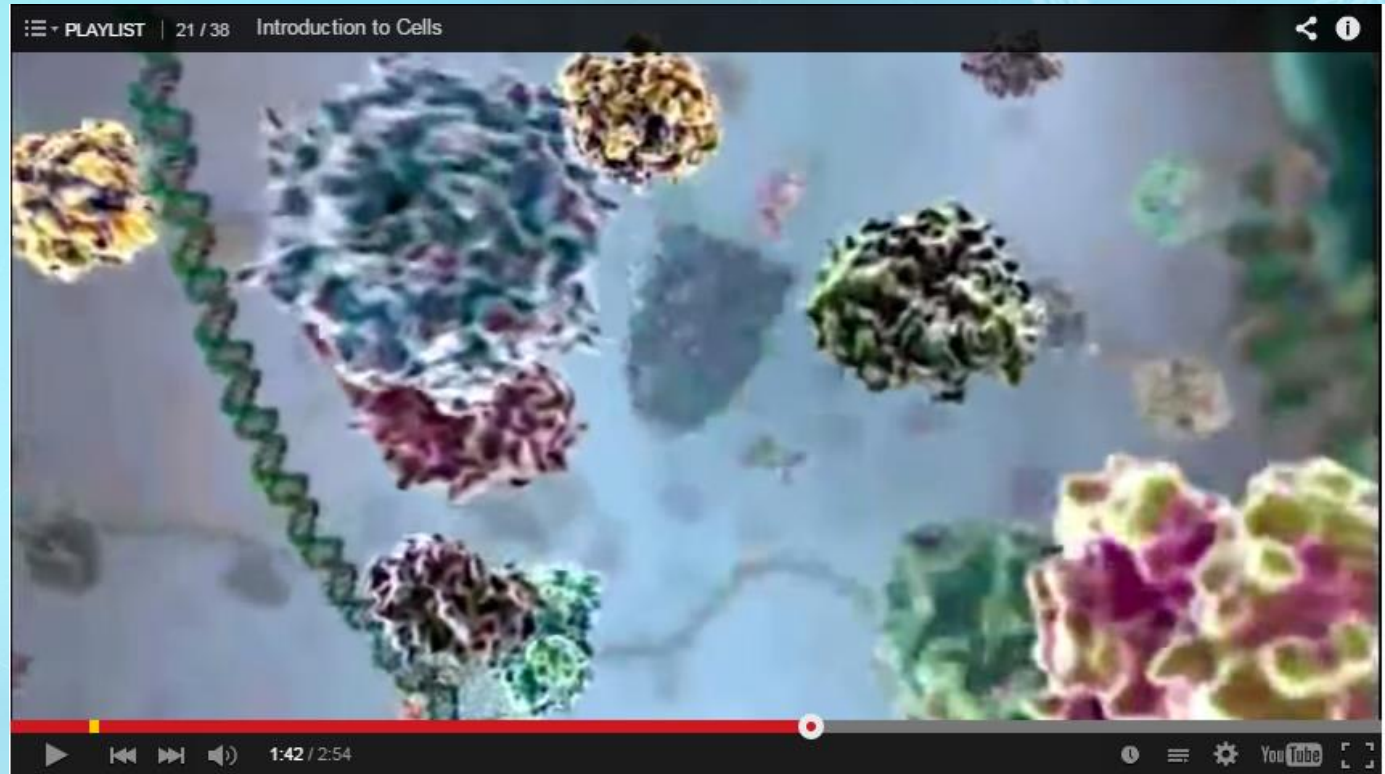


Basic Structure of a Cell



Intro Cells – Movie Trailer



Recall: What Are the Main Characteristics of Life?

1. Require **ENERGY** (food)
2. **REPRODUCE** (species)
3. Maintain **HOMEOSTASIS**
4. **ORGANIZED** and made of cells
5. **ADAPT** to environment
6. **GROW** and **DEVELOP**

LEVELS OF ORGANIZATION

Nonliving Levels:

1. ATOM (element)

2. MOLECULES (4 organic macromolecules:
carbohydrates, lipids, nucleic acids & proteins)

3. ORGANELLES (nucleus, ER, Golgi ...)

LEVELS OF ORGANIZATION

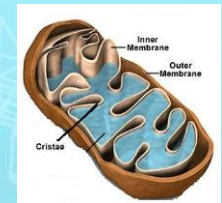
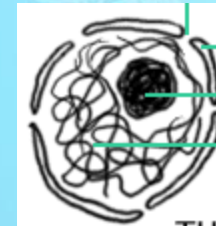
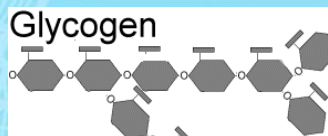
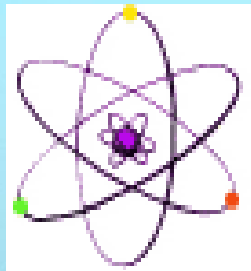
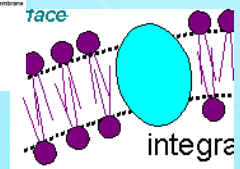
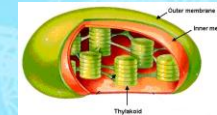
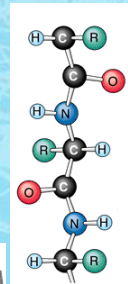
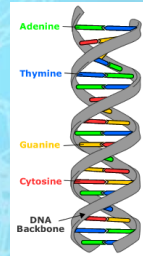
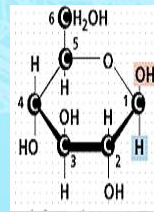
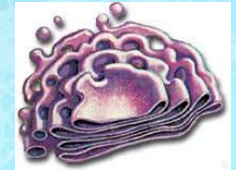
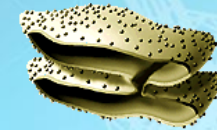
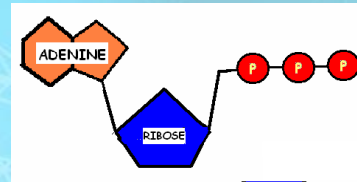
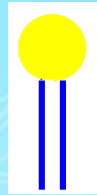
Living Levels:

1. **CELL** (makes up ALL organisms)
2. **TISSUE** (cells working together)
3. **ORGAN** (heart, brain, stomach ...)
4. **ORGAN SYSTEMS** (respiratory, circulatory ...)
5. **ORGANISM**

Nonliving Levels

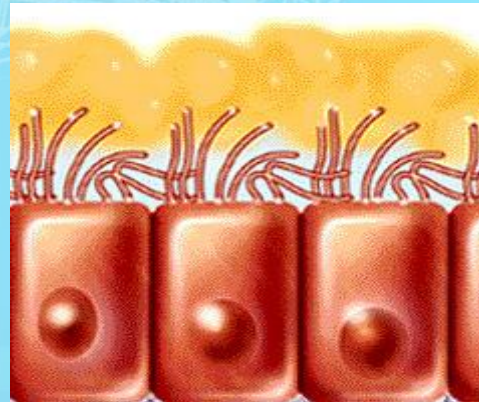
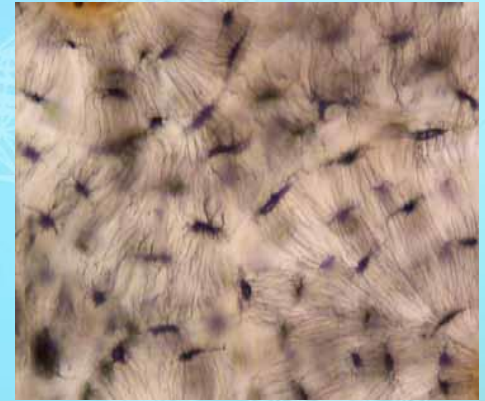
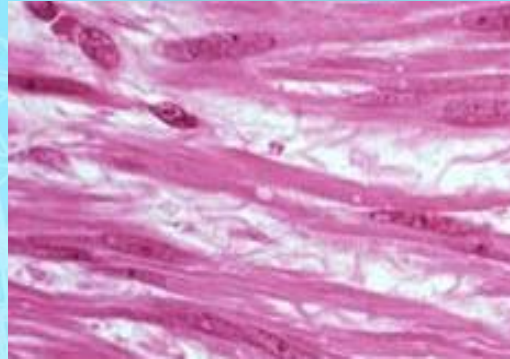
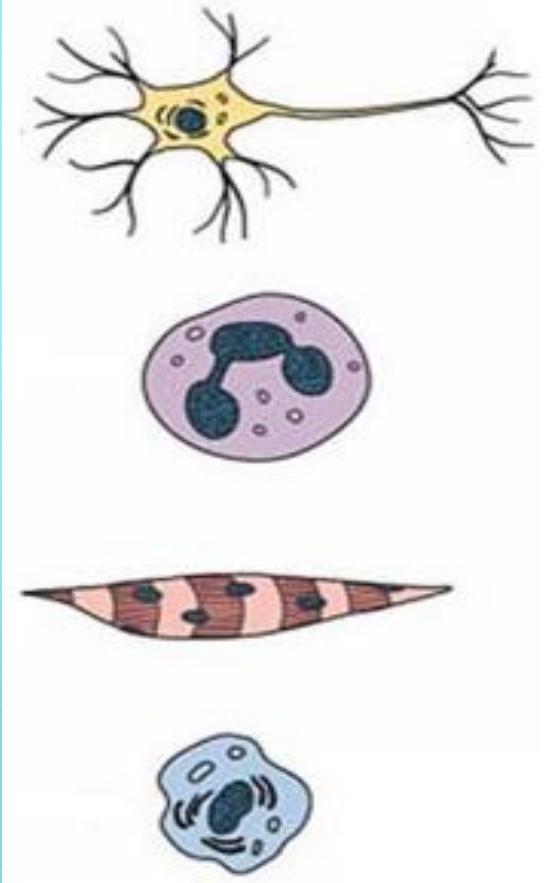
Periodic Table of the Elements

1A																	0	
1	H																	He
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
7	Fr	Ra	+Ac	Rf	Ha	106	107	108	109	110								



ATOMS → MOLECULES → ORGANELLES

Living Levels

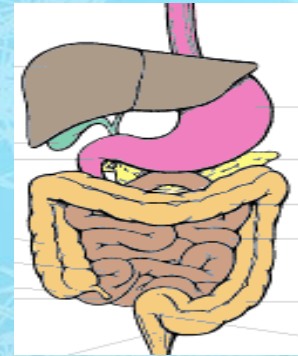
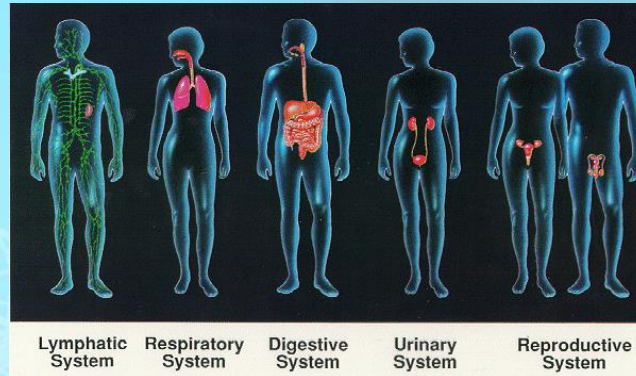
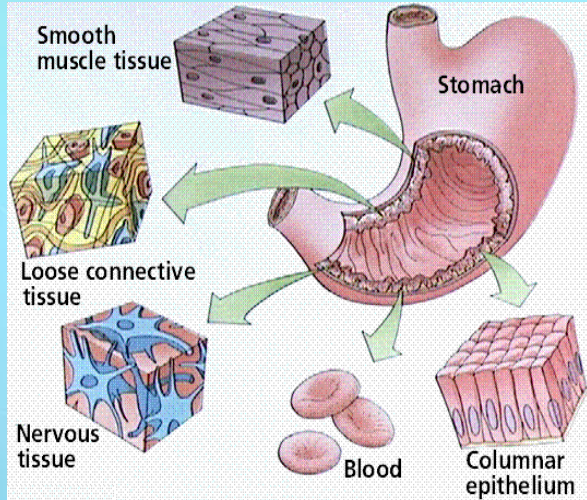


CELLS - life starts here



TISSUES - Similar cells working together

More Living Levels



ORGANS



ORGAN SYSTEMS

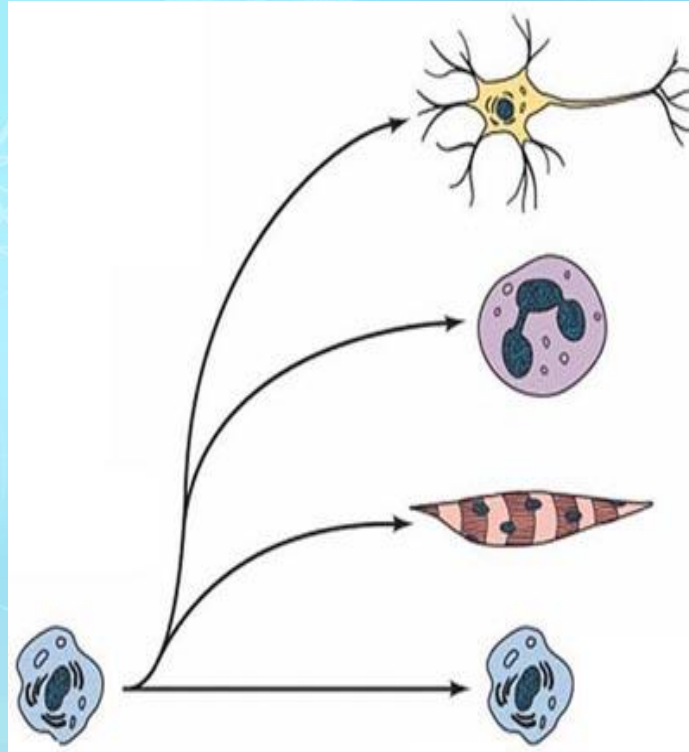


ORGANISM

Different tissues working together

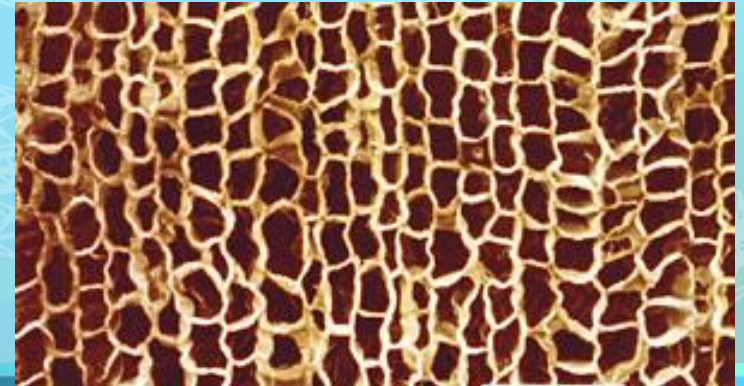
Different organs working together

History of Cells & the Cell Theory



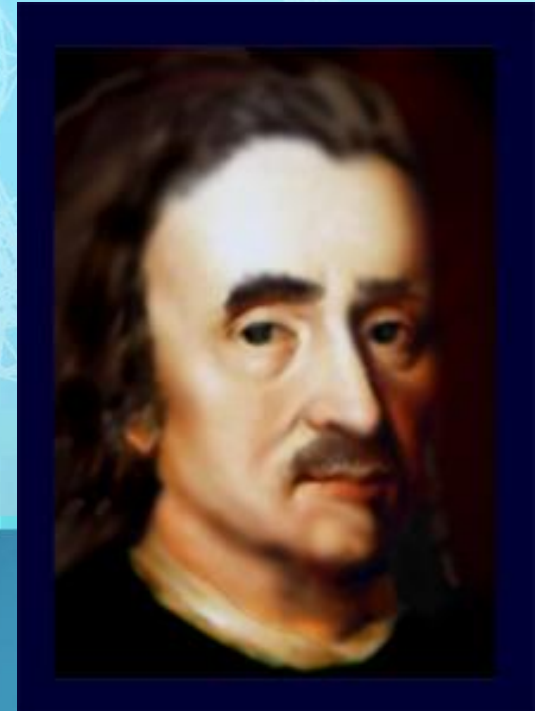
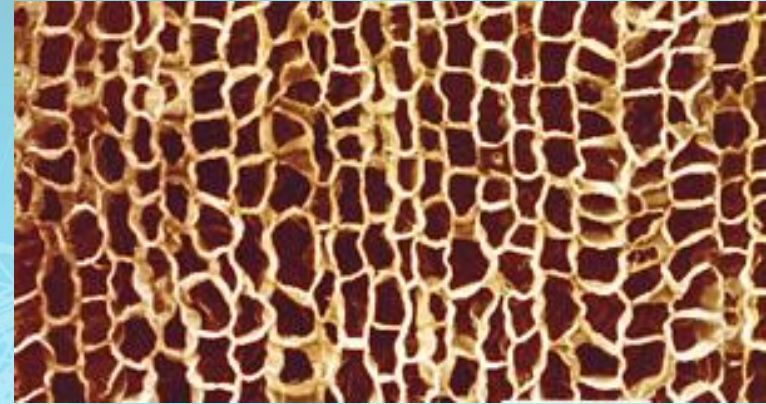
First to View Cells

- In 1665, **Robert Hooke** used a microscope to examine a thin slice of **cork** (dead plant cell walls)
- What he saw looked like small boxes



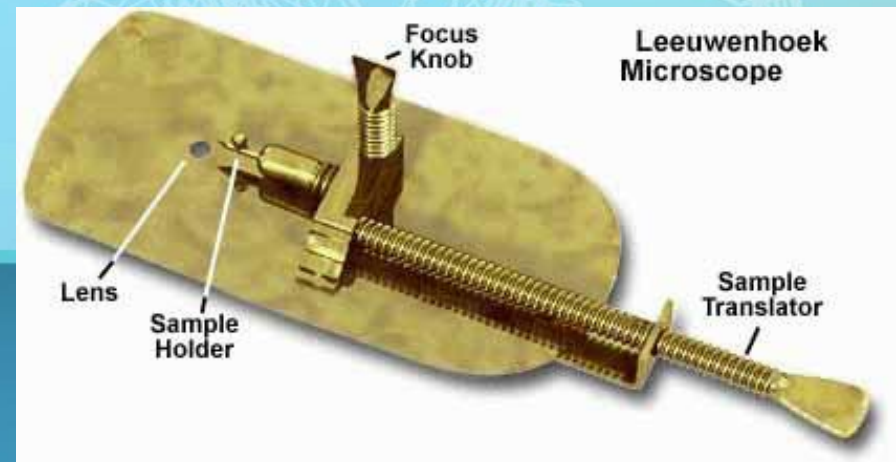
First to View Cells

- Hooke is responsible for **naming cells**
- Hooke called them "CELLS" because they looked like the **small rooms (cells) that monks lived in**



Anton van Leeuwenhoek

- In 1673, **Leeuwenhoek** (a Dutch microscope maker), **was first to view a LIVING organism**. Leeuwenhoek used a simple microscope to view **pond water & scrapings from his teeth**.



Beginning of the Cell Theory

- In 1838, a German botanist named **Matthias Schleiden** concluded that all **plants** are made of cells
- Schleiden is a **cofounder** of the **cell theory**



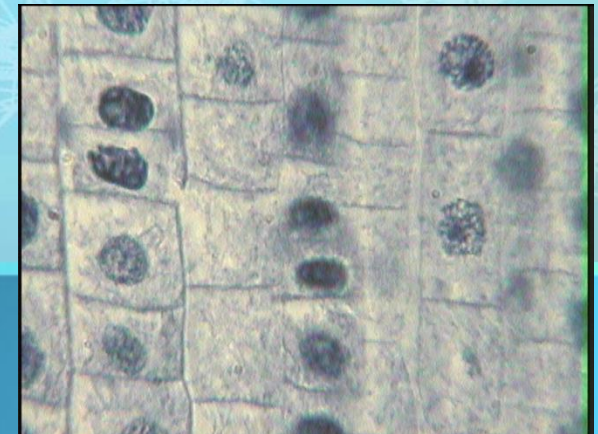
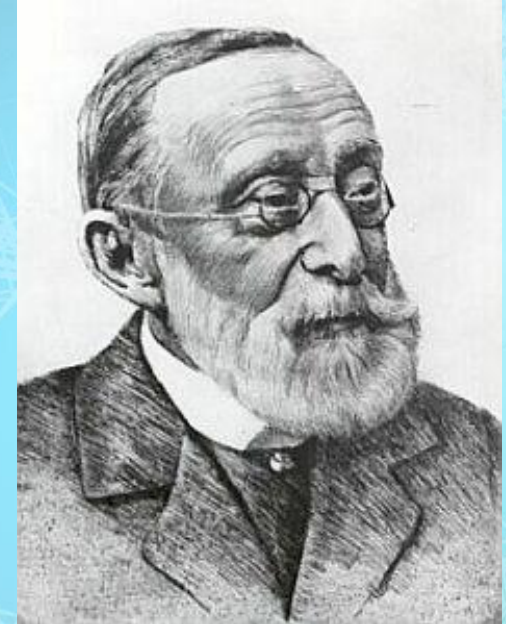
Beginning of the Cell Theory

- In 1839, a German zoologist named **Theodore Schwann** concluded that all **animals** were also made of cells
- Schwann also **cofounded** the **cell theory**



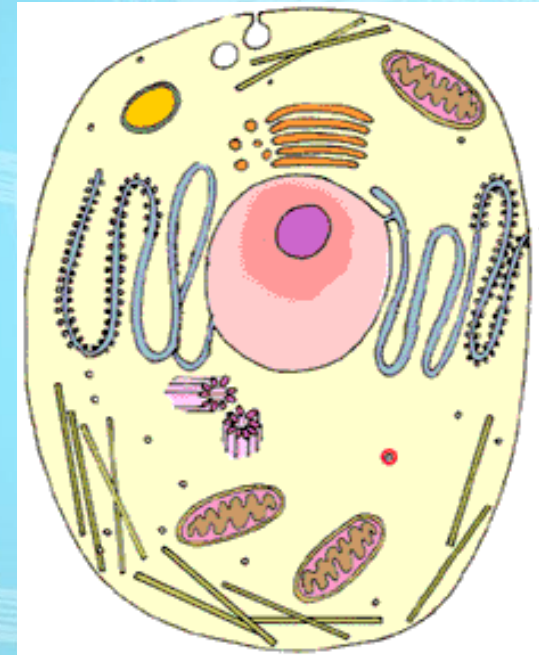
Beginning of the Cell Theory

- In 1855, a German medical doctor named **Rudolph Virchow** observed, under the microscope, **cells dividing**
- He reasoned that **all cells come from other pre-existing cells** by cell division

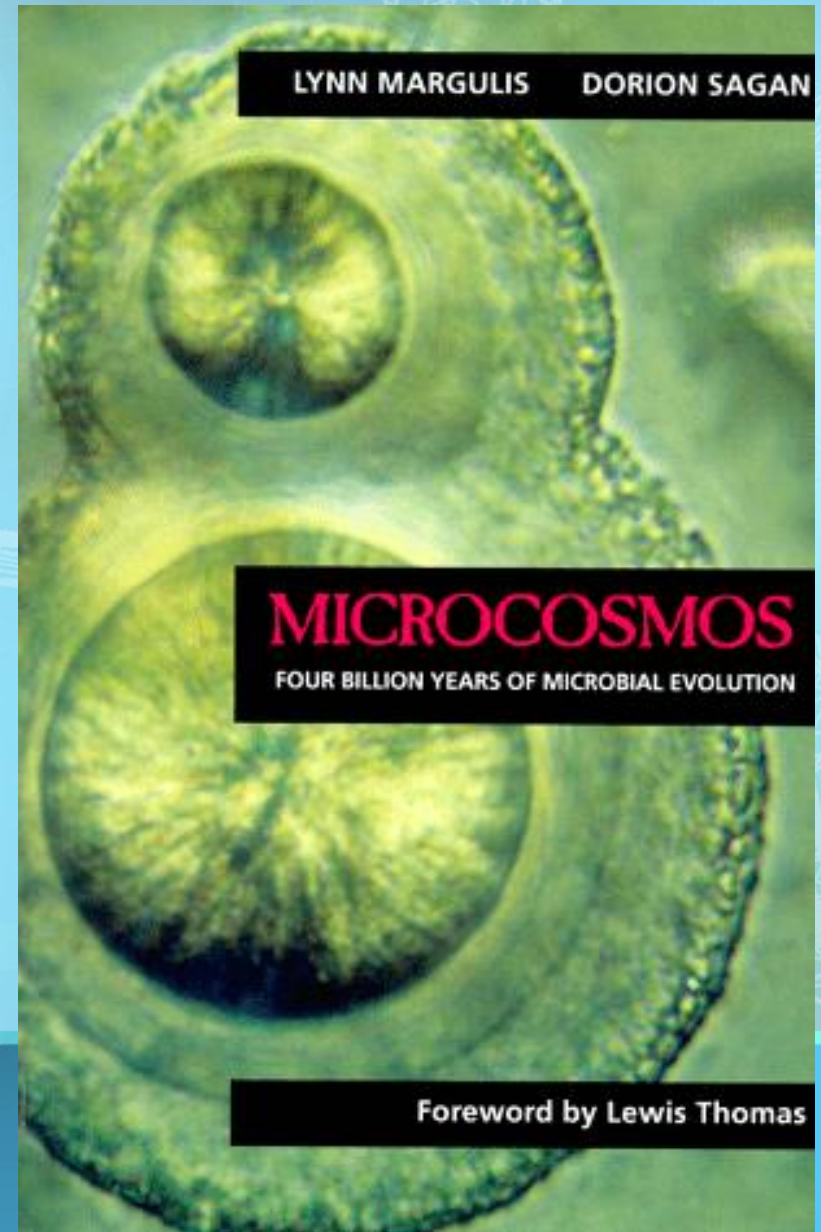


CELL THEORY

1. All living things are made of **cells**
2. Cells are the basic unit of **structure and function** in an organism (basic unit of life)
3. All cells arise from pre-existing cells (reproduction/ cell division)

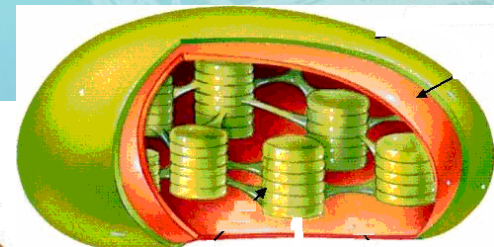


Discoveries *Since the Cell* Theory



ENDOSYMBIOTIC THEORY

- In 1970, American biologist, **Lynn Margulis**, provided evidence that **some organelles within cells were at one time free living cells themselves**
- Supporting evidence includes **organelles with their own DNA**
- **Chloroplast and Mitochondria**

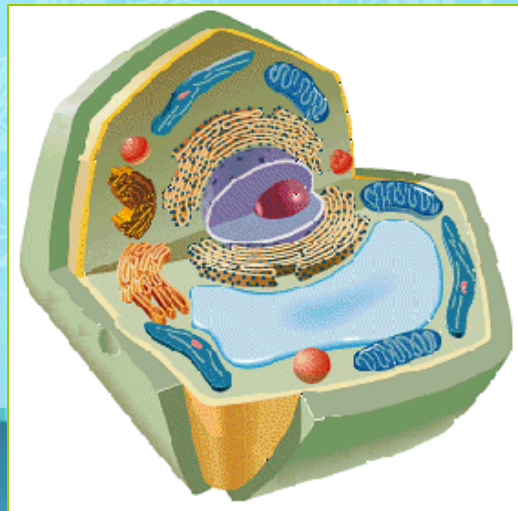


Cell Size and Types

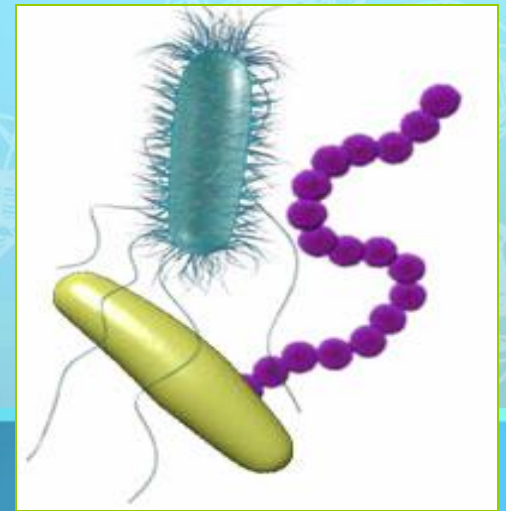
- Cells, the basic units of organisms, can only be **observed under microscope**
- Three Basic types of cells include:



Animal Cell

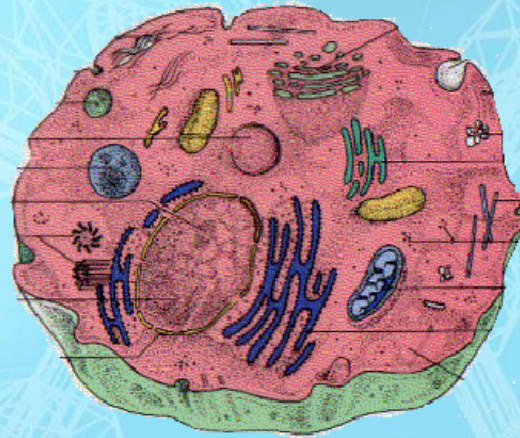


Plant Cell



Bacterial Cell

Which Cell Type is Larger?



Bacteria

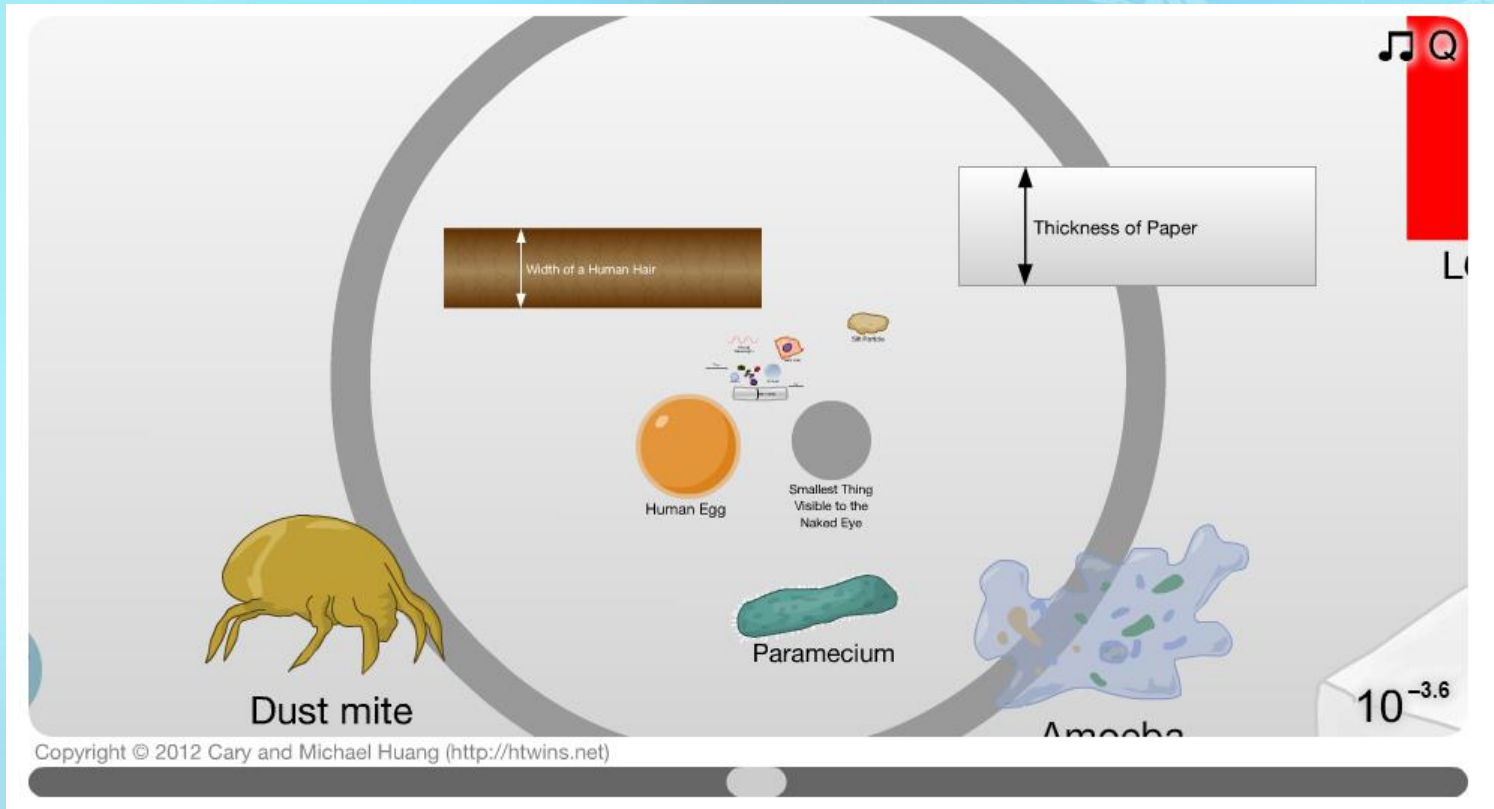


Animal cell

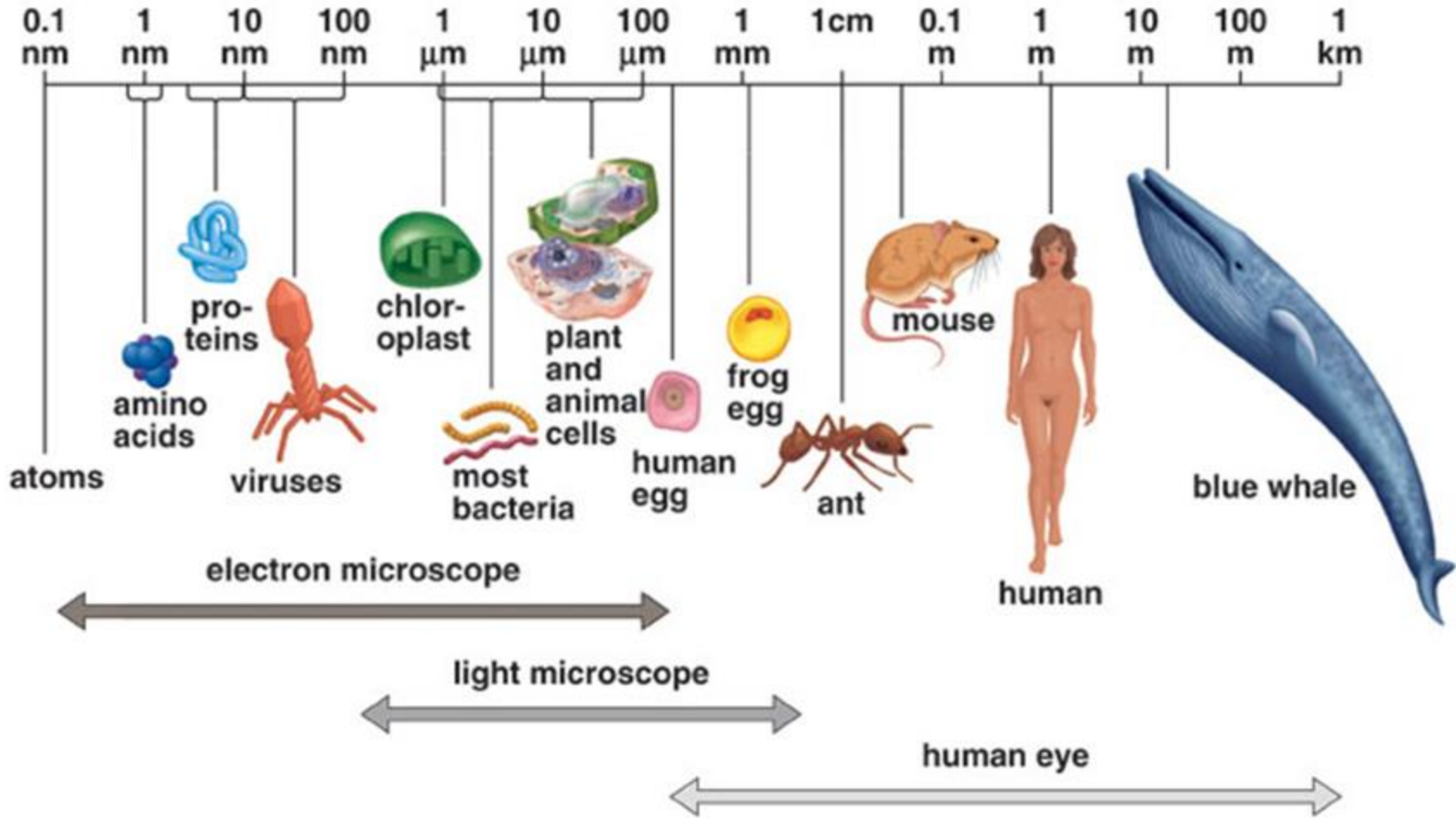


Plant cell

Scale of the Universe



CELL SIZE



Typical cells range from 5 - 50 micrometers (microns) in diameter

Number of Cells

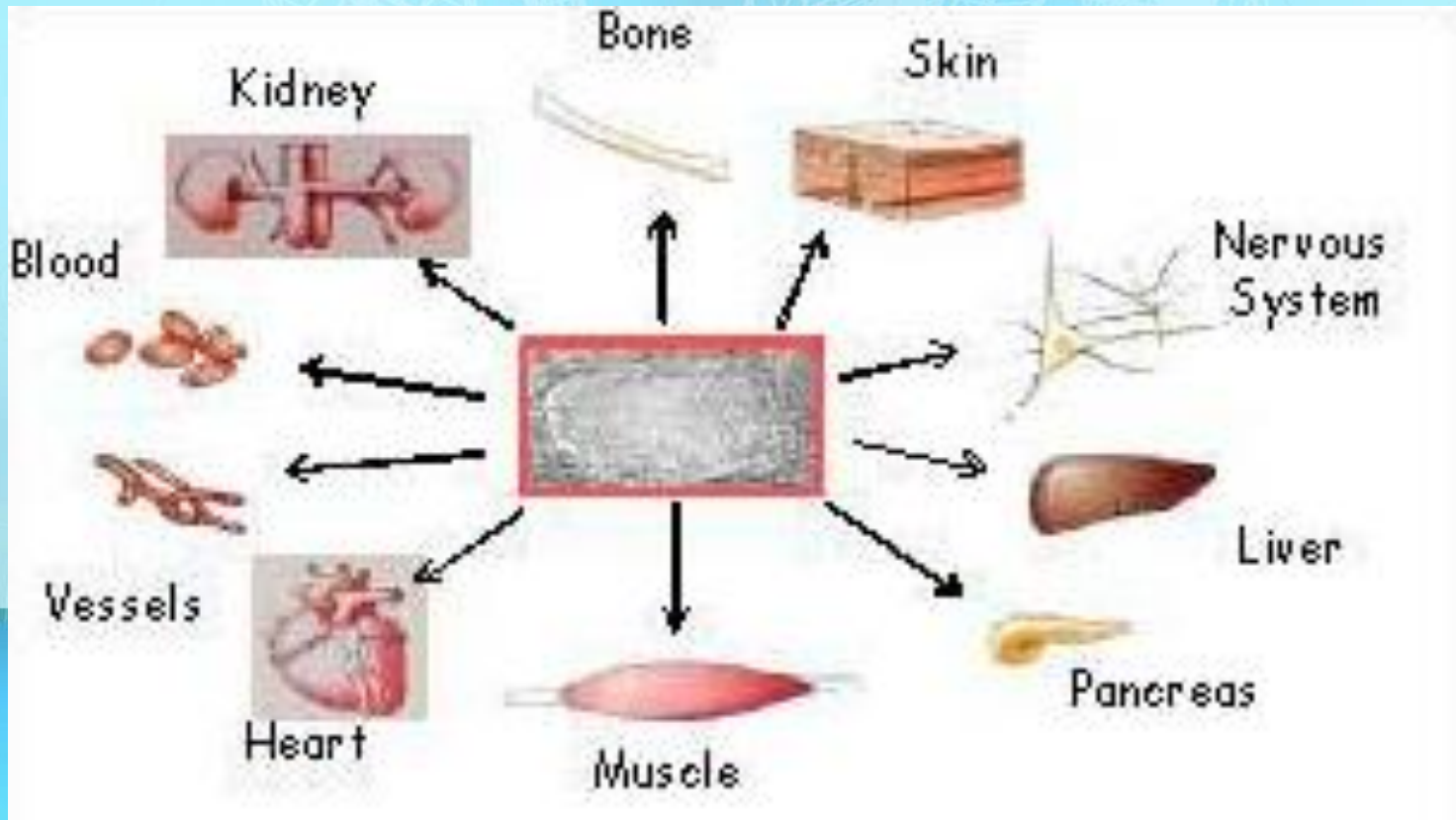
Although **ALL** living things are made of cells, organisms may be:

- ***Unicellular*** - composed of one cell
- ***Multicellular***- composed of many cells that may organize into tissues, etc.



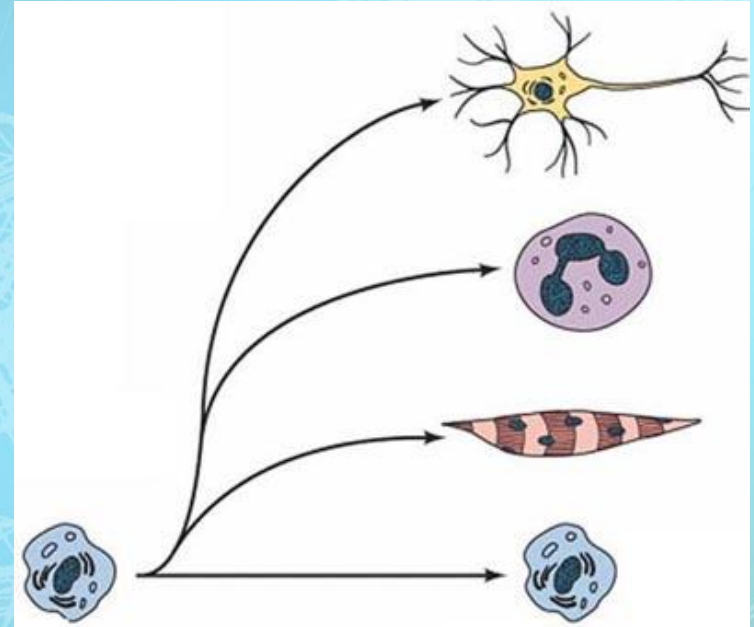
Multicellular Organisms

- Cells in multicellular organisms often **specialize** (take on different shapes & functions)



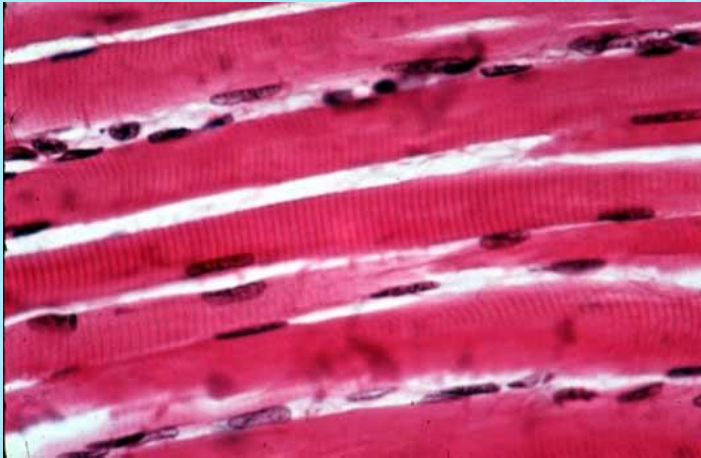
Cell Specialization

- Cells in a multi-cellular organism become specialized by **turning different genes on and off**
- This is known as **DIFFERENTIATION**



Specialized Animal Cells

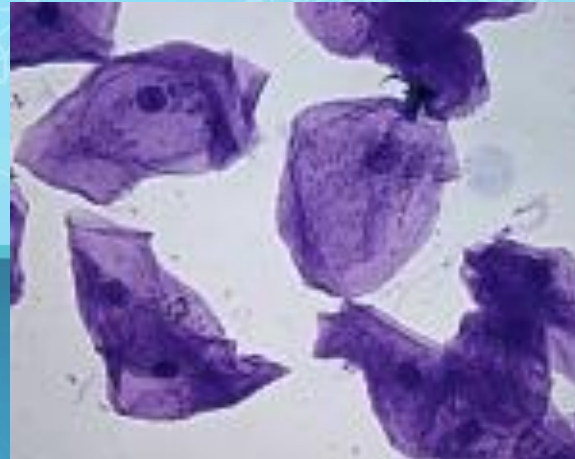
Muscle cells



Red blood cells

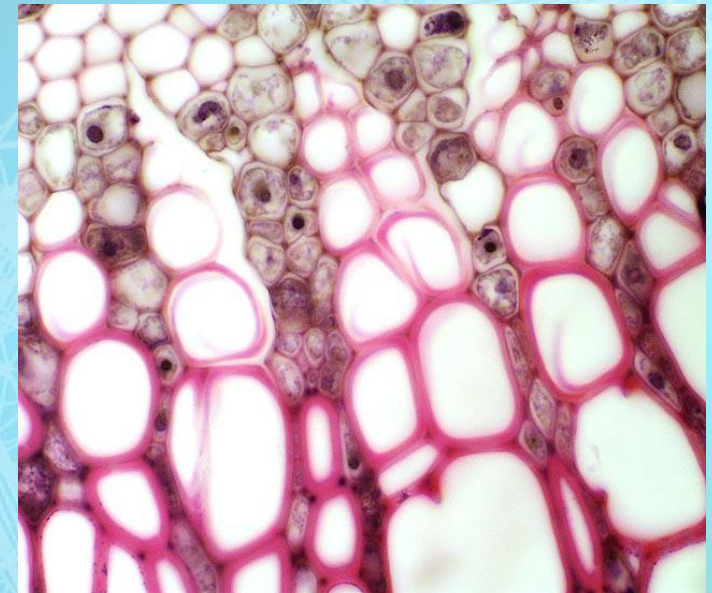
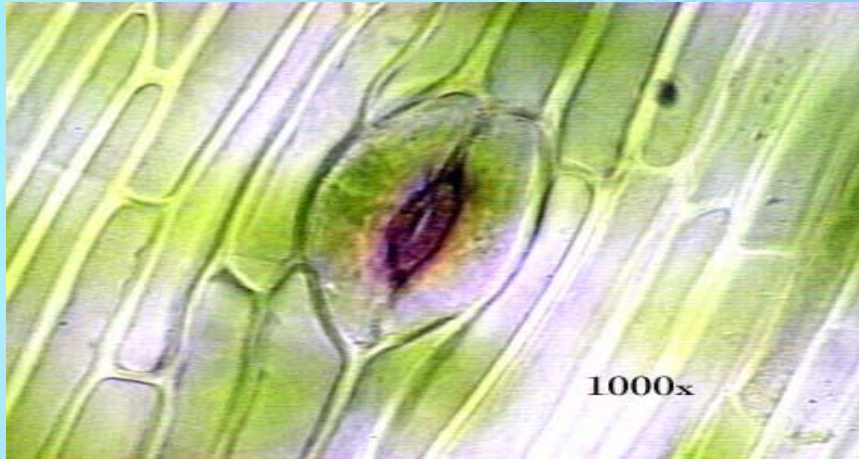


Cheek cells



Specialized Plant cells

Guard Cells

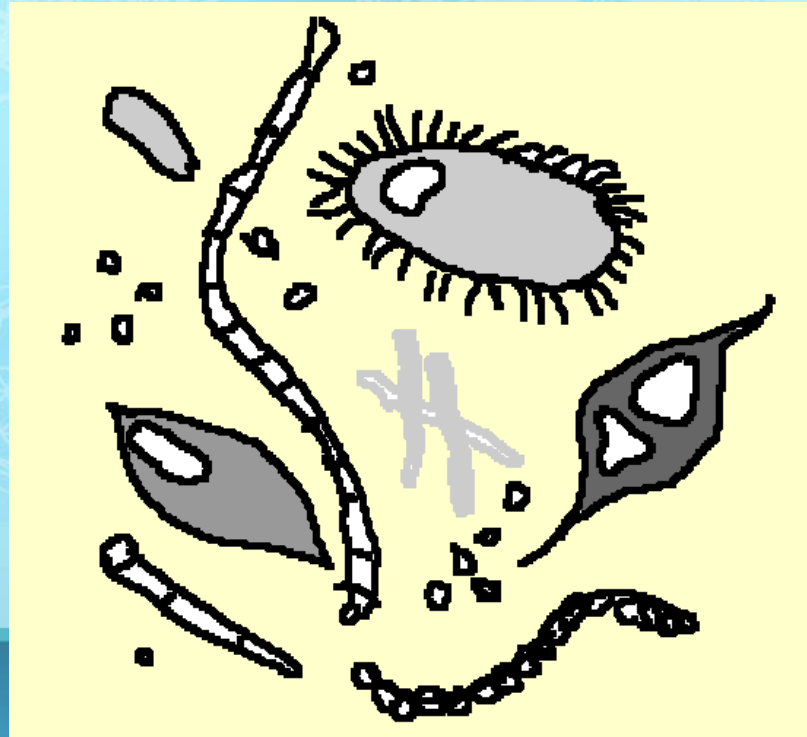


Pollen



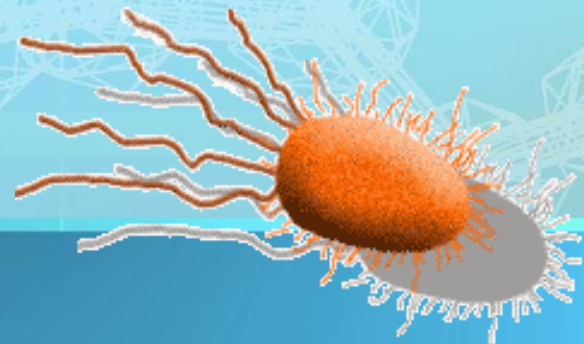
Xylem cells

Prokaryotes vs. Eukaryotes



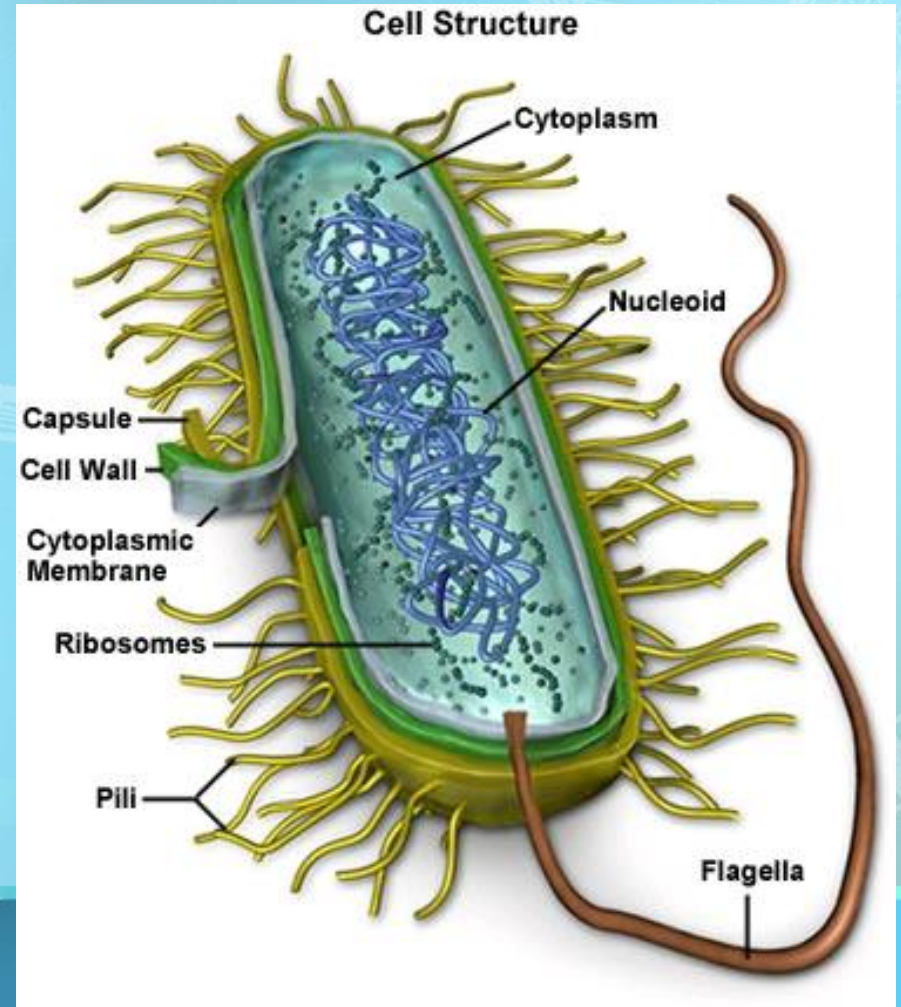
Prokaryotes - The first Cells

- Cells that lack a nucleus or membrane-bound organelles
- Includes bacteria
- Simplest type of cell
- Single, circular chromosome



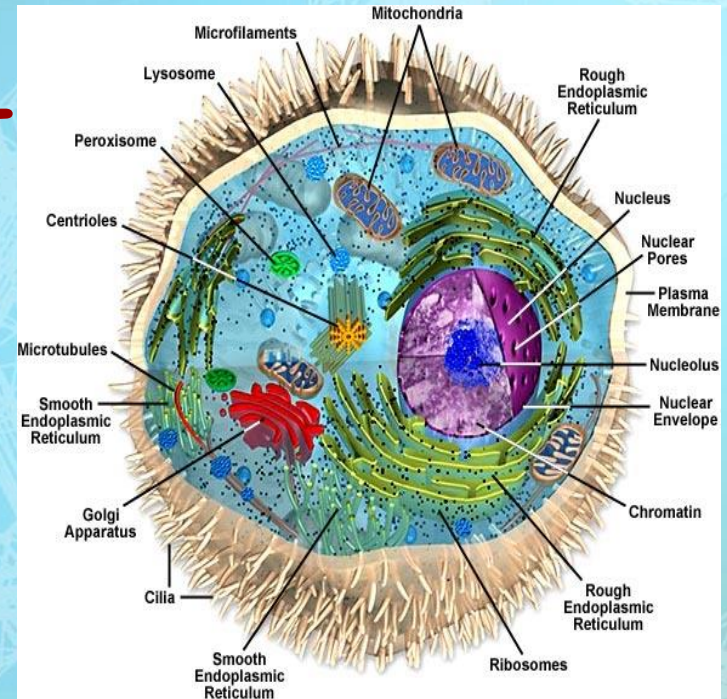
Prokaryotes

- **Nucleoid region** (center) contains the DNA
- Surrounded by **cell membrane & cell wall**
- Contain **ribosomes** (no membrane) in their cytoplasm to **make proteins**



Eukaryotes

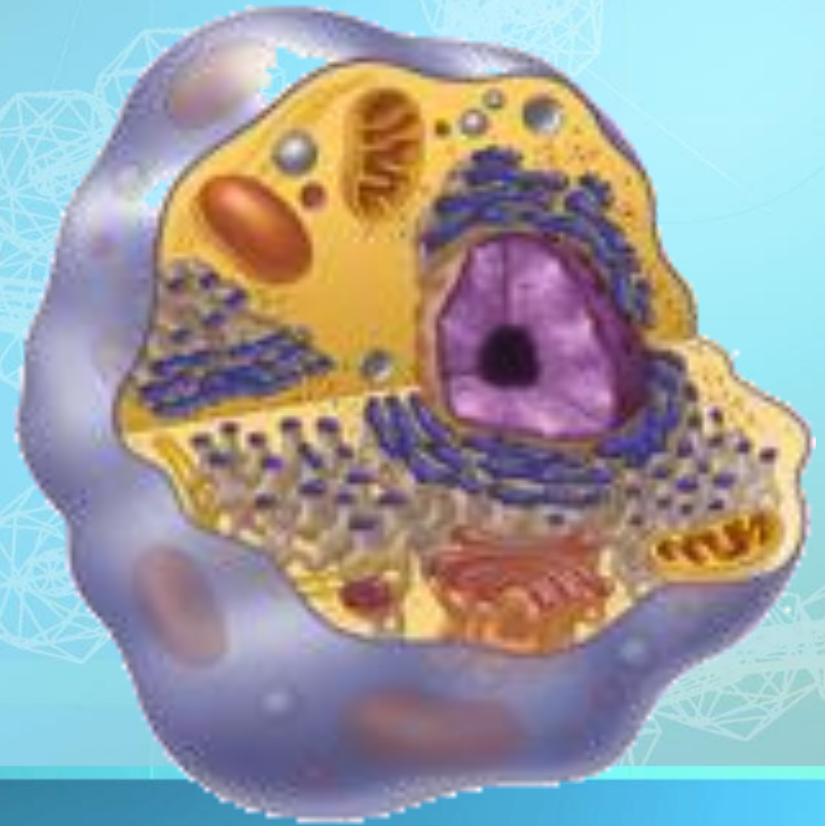
- Cells that **HAVE a nucleus and membrane-bound organelles**
- Includes **protists, fungi, plants, and animals**
- More **complex** type of cells



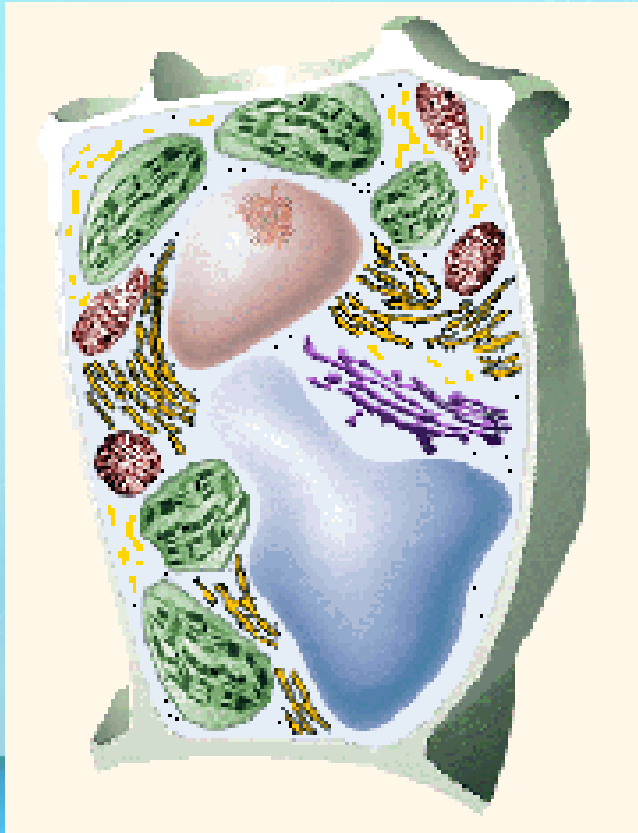
Eukaryotic Cell

Contain 3 basic cell structures:

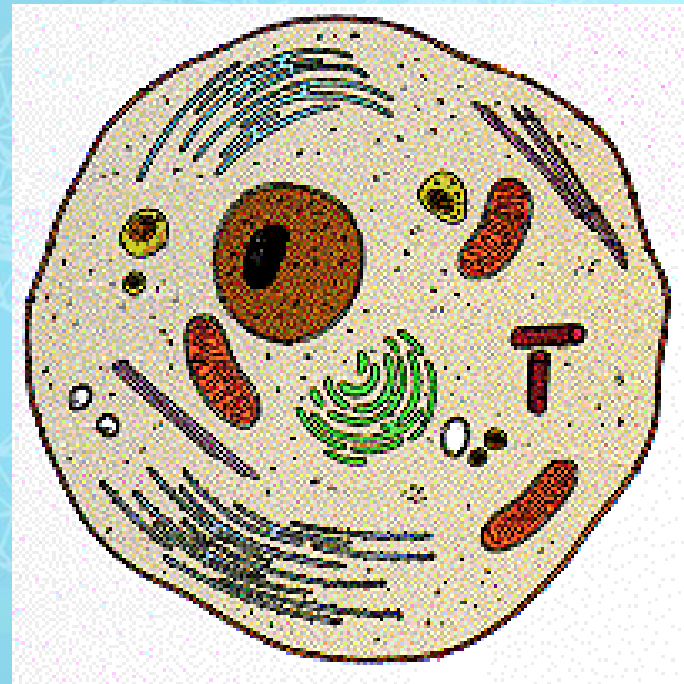
- **Nucleus**
- **Cell Membrane**
- **Cytoplasm with organelles**



Two Main Types of Eukaryotic Cells

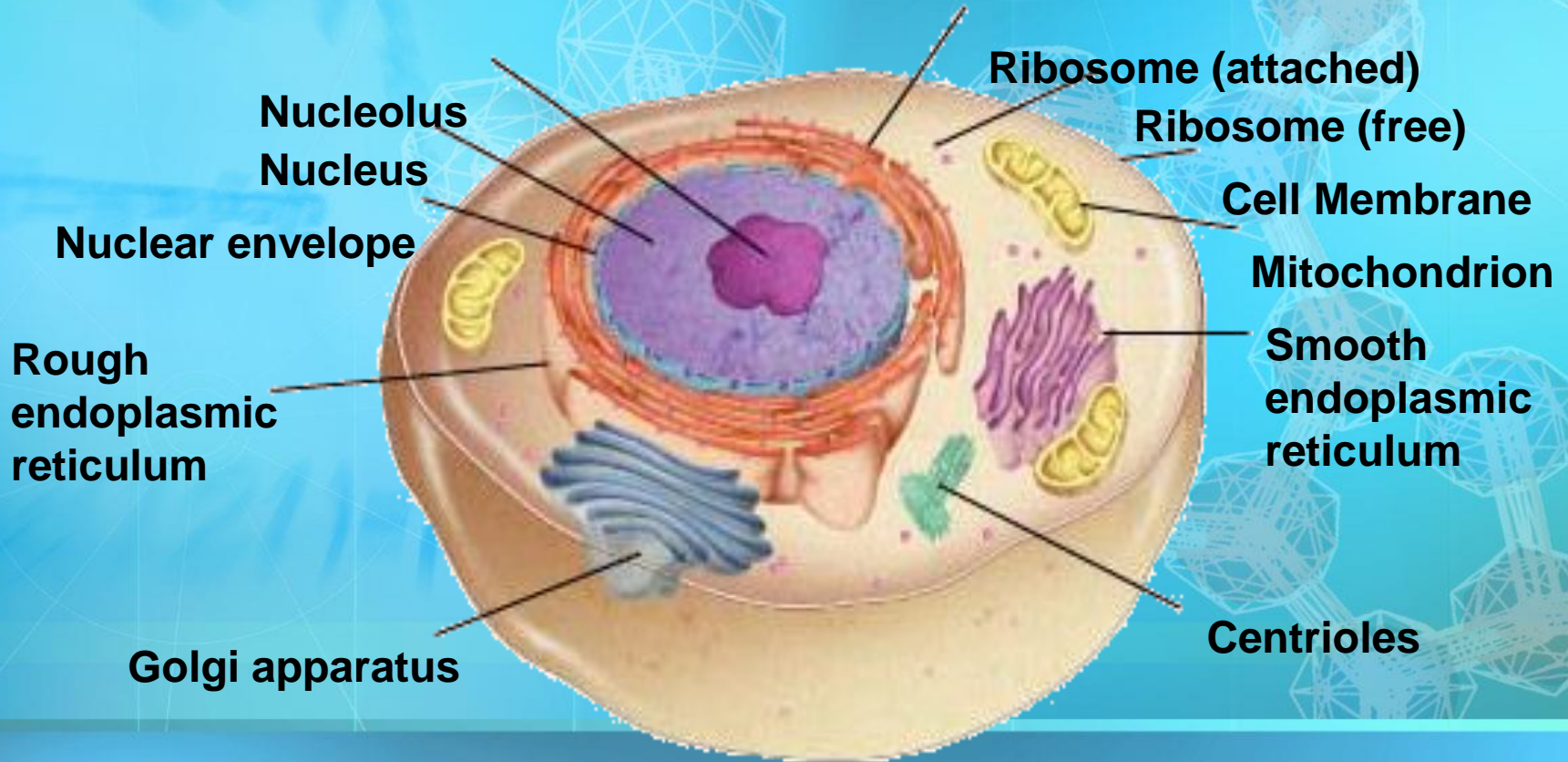


Plant Cell

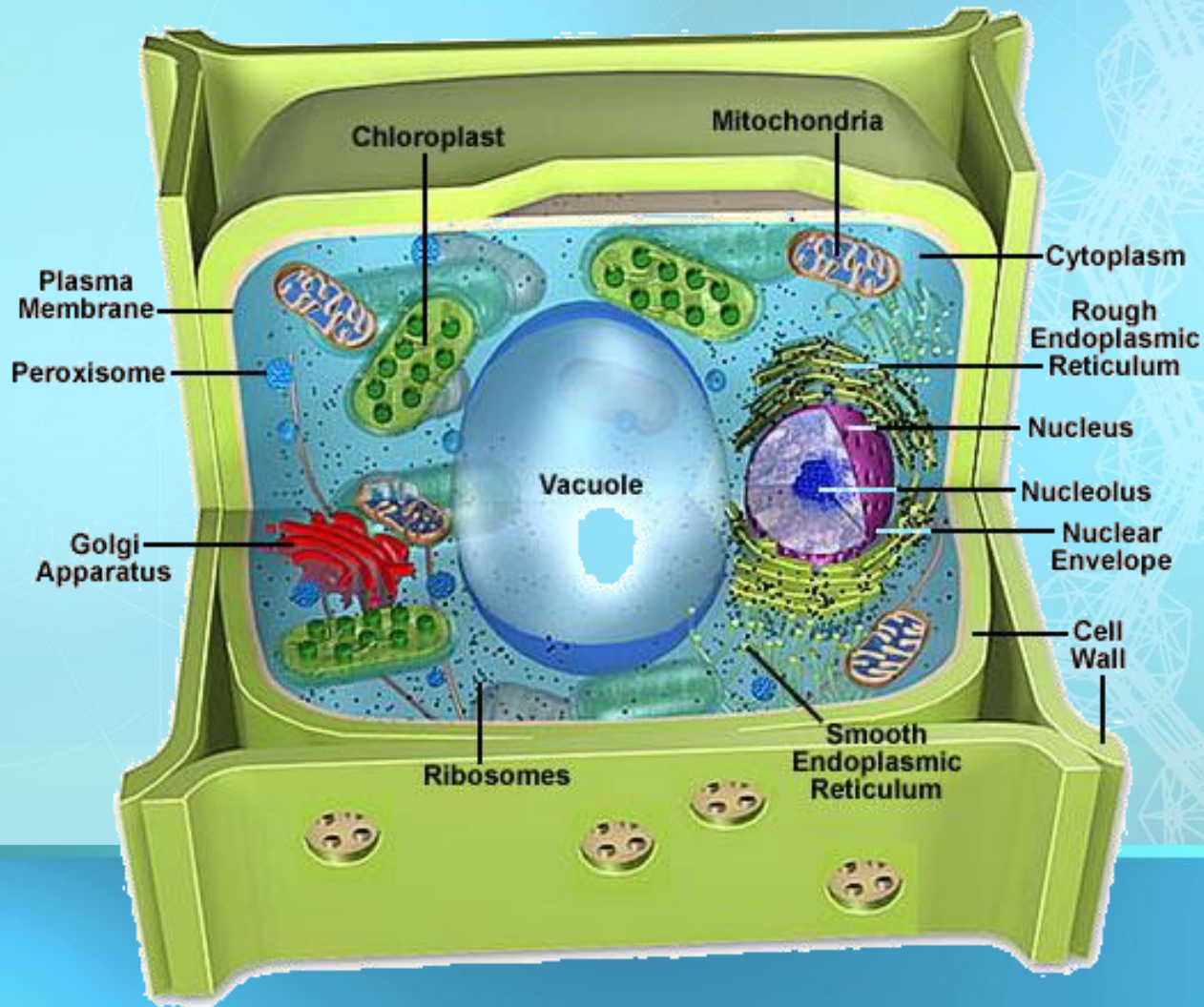


Animal Cell

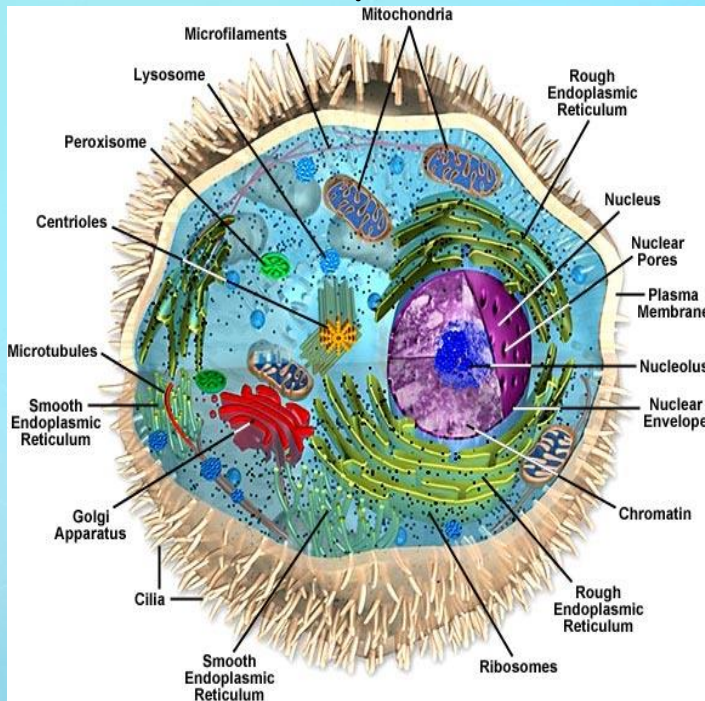
Animal Cell Organelles



Plant Cell Organelles



Animal



Plant

